Plant Physiol. (1984) 74, iii–viii
0032-0889/84/74/iii/06/$01.00/0

Volume Contents

Number 1. January

1 **Photosynthetic and Stomatal Responses of Two Mangrove Species, *Aegiceras corniculatum* and *Avicennia marina*, to Long Term Salinity and Humidity Conditions**—Marilyn C. Ball* and Graham D. Farquhar

7 **Photosynthetic and Stomatal Responses of the Grey Mangrove, *Avicennia marina*, to Transient Salinity Conditions**—Marilyn C. Ball* and Graham D. Farquhar

12 **Biochemistry of Photosynthesis in Species of *Triticum* of Differing Ploidy**—Gabriel P. Holbrook, Alfred J. Keys*, and Rachel M. Leech

16 **Sugar Uptake by Cotton Tissues. Leaf Disc *Versus* Cultured Roots**—Donald L. Hendrix*

21 **Plant Desiccation and Protein Synthesis. IV. RNA Synthesis, Stability, and Recruitment of RNA into Protein Synthesis during Desiccation and Rehydration of the Desiccation-Tolerant Moss, *Tortula ruralis***—Melvin J. Oliver and J. Derek Bewley*

26 **Characterization of Amino Acid Efflux from Isolated Soybean Cells**—Jacob Secor and Larry E. Schrader*

32 **Ethylene-Independent and Ethylene-Dependent Biochemical Changes in Ripening Tomatoes**—David Jeffery, Christopher Smith, Peter Goodenough*, Ian Prosser, and Donald Grierson

39 **Effects of Fusaric Acid on Tomato Root Hair Membrane Potentials and ATP Levels**—Annie D'Alton and Bud Etherton*

43 **[^{14}C]Sucrose Uptake and Labeling of Starch in Developing Grains of Normal and *seg*1 Barley**—Frederick C. Felker, David M. Peterson*, and Oliver E. Nelson

47 **Stomatal Behavior and CO_2 Exchange Characteristics in Amphistomatous Leaves**—Keith A. Mott and James W. O'Leary

52 **Host-Pathogen Interactions. XXV. Endopolygalacturonic Acid Lyase from *Erwinia carotovora* Elicits Phytoalexin Accumulation by Releasing Plant Cell Wall Fragments**—Keith R. Davis, Gary D. Lyon, Alan G. Darvill, and Peter Albersheim*

61 **Perturbation of *Chara* Plasmalemma Transport Function by 2[4(2′,4′-Dichlorophenoxy)phenoxy]propionic Acid**—William J. Lucas*, Clyde Wilson, and John P. Wright

67 **Photochemical Apparatus Organization in *Anacystis nidulans* (Cyanophyceae). Effect of CO_2 Concentration during Cell Growth**—Annamaria Manodori and Anastasios Melis*

72 **Effect of Salinity on Nodule Formation by Soybean**—Paul W. Singleton* and B. Ben Bohlool

77 **Temperature-Induced Change in the Water Relations of *Abies amabilis* (Dougl.) Forbes**—Robert O. Teskey*, Thomas M. Hinckley, and Charles C. Grier

81 **Amelioration of Chilling-Induced Water Stress by Abscisic Acid-Induced Changes in Root Hydraulic Conductance**—Albert H. Markhart, III*

84 **Host Recognition in the *Rhizobium*-Soybean Symbiosis. Detection of a Protein Factor in Soybean Root Exudate Which Is Involved in the Nodulation Process**—Larry J. Halverson and Gary Stacey*

90 **Influence of Iron Deprivation on the Membrane Composition of *Anacystis nidulans***—James A. Guikema and Louis A. Sherman*

96 **Psychrometric Field Measurement of Water Potential Changes following Leaf Excision**—Michael J. Savage* and Alfred Cass

99 **Enhancement by Ethylene of Cellulysin-Induced Ethylene Production by Tobacco Leaf Discs**—Edo Chalutz, Autar K. Mattoo*, Theo Solomos, and James D. Anderson

104 **Carbon, Hydrogen, and Oxygen Isotope Ratios of Cellulose from Plants Having Intermediary Photosynthetic Modes**—Leonel O'Reilly Sternberg, Michael J. Deniro, and Irwin P. Ting*

108 **Incorporation of Oxygen into Glycolate, Glycine, and Serine during Photorespiration in Maize Leaves**—Pascale Jolivet-Tournier* and Richard Gerster

112 **Terpenoid Metabolism in Plastids. Sites of Phytoene Synthetase Activity and Synthesis in Plant Cells**—Bilal Camara*

117 **Biological Activity of the Isomeric Forms of *Helminthosporium sacchari* Toxin and of Homologs Produced in Culture**—Jonathan P. Duvick, J. M. Daly*, Z. Kratky, V. Macko, W. Acklin, and D. Arigoni

123 **Characterization by Enzyme-Linked Immunosorbent Assay of Monoclonal Antibodies to *Pisum* and *Avena* Phytochrome**—Marie-Michèle Cordonnier, Hubert Greppin, and Lee H. Pratt*

128 **Role of Nitrogen Assimilation in Seed Development of Soybean**—Daniel R. Nelson*, Robert J. Bellville, and Clark A. Porter

134 ***In Vitro* Fatty Acid Synthesis and Complex Lipid Metabolism in the Cyanobacterium *Anabaena variabilis*. I. Some Characteristics of Fatty Acid Synthesis**—Nora W. Lem and Paul K. Stumpf*

139 **Evidence for Host Genome Involvement in Cytokinin Metabolism by Male and Female Cells of *Mercurialis annua* Transformed by Strain 15,955 of *Agrobacterium tumefaciens***—B. Guerin, G. Kahlem, G. Teller, and Bernard Durand*

146 **Biosynthesis of Protoheme and Heme *a* Precursors Solely from Glutamate in the Unicellular Red Alga *Cyanidium caldarium***—Jon D. Weinstein and Samuel I. Beale*

152 **Acquisition of Thermotolerance in Soybean Seedlings. Synthesis and Accumulation of Heat Shock Proteins and their Cellular Localization**—Chu-Yung Lin*, J. K. Roberts, and Joe L. Key

161 **Acclimation of Photosynthesis to Low Leaf Water Potentials**—Mark A. Matthews* and John S. Boyer

167 **A Novel Method for the Activation and Solubilization of Coupling Factor 1 from Chloroplasts of *Euglena gracilis***—Joseph S. Kahn*

170 **Temperature Dependence of Energy-Transducing Functions and Inhibitor Sensitivity in Chloroplasts**—Jaap J. Schuurmans, Enno C. I. Veerman, Jan A. Francke, José M. G. Torres-Pereira, and Ruud Kraayenhop*

176 **Formation of Elemental Sulfur by *Chlorella fusca* dur-**

ing Growth on L-Cysteine Ethylester—Friedrich Krauss, Wolfram Schäfer, and Ahlert Schmidt*

SHORT COMMUNICATIONS

183 Salt Adaptation of the Cyanobacterium *Synechococcus* 6311 Growing in a Continuous Culture (Turbidostat)—Eduardo Blumwald and Elisha Tel-Or*

186 Reversion from Light-Induced Inhibition of Seed Germination by Respiratory Inhibitors—Noriaki Tanno*

189 Pyruvate Orthophosphate Dikinase. Intracellular Site of Synthesis in Maize Leaf Cells—Sherry L. Gee, Steven Ruzin, and James A. Bassham*

Number 2. February

193 Microsomal Phospholipid Molecular Species Alterations during Low Temperature Acclimation in *Dunaliella*—Daniel V. Lynch and Guy A. Thompson, Jr.*

198 Chloroplast Phospholipid Molecular Species Alterations during Low Temperature Acclimation in *Dunaliella*—Daniel V. Lynch and Guy A. Thompson, Jr.*

204 Occurrence of Isoenzymes of Glutamine Synthetase in the Alga *Chlorella kessleri*—Nazira Sumar, Peter J. Casselton, Sheila F. McNally, and George R. Stewart*

208 Effects of Light on Protein Patterns in Gravitropically Stimulated Root Caps of Corn—Lewis J. Feldman* and Viqui Gildow

213 Effects of the Proline Analog L-Thiazolidine-4-carboxylic Acid on Proline Metabolism—Thomas E. Elthon and Cecil R. Stewart*

219 Further Characterization on the Transport Property of Plasmalemma NADH Oxidation System in Isolated Corn Root Protoplasts—Willy Lin*

223 Prevention of Action of Far-Red-Absorbing Phytochrome in *Rumex crispus* L. Seeds by Ethanol—Ray B. Taylorson*

227 Effect of Nitrogen Source on Ureides in Soybean—David L. McNeil and Thomas A. LaRue*

233 Influence of Elevated Carbon Dioxide on Water Relations of Soybeans—Hugo H. Rogers, Nasser Sionit, Jennifer D. Cure*, Joy M. Smith, and Gail E. Bingham

239 Phytohormones, *Rhizobium* Mutants, and Nodulation in Legumes. V. Cytokinin Metabolism in Effective and Ineffective Pea Root Nodules—Jane Badenoch-Jones*, Barry G. Rolfe, and David S. Letham

247 Reinforced Polyproline II Conformation in a Hydroxyproline-Rich Cell Wall Glycoprotein from Carrot Root—Gerrit-Jan van Holst and Joseph E. Varner*

252 Osmoregulation or Turgor Regulation in *Chara*?—Mary A. Bisson* and Dolores Bartholomew

256 Magnesium Deficiency Results in Increased Suberization in Endodermis and Hypodermis of Corn Roots—José M. Pozuelo, Karl E. Espelie, and P. E. Kolattukudy*

261 Purification of Glyoxysomal Catalase and Immunochemical Comparison of Glyoxysomal and Leaf Peroxisomal Catalase in Germinating Pumpkin Cotyledons—Junji Yamaguchi and Mikio Nishimura*

268 Calcium Inhibits Phase Shifting of the Circadian Conidiation Rhythm of *Neurospora crassa* by the Calcium Ionophore A23187—Hideaki Nakashima*

272 Is There a Role for the Apex in Shoot Geotropism?—James W. Hart and Ian R. Macdonald*

278 *Myo*-Inositol Esters of Indole-3-acetic Acid Are Endogenous Components of *Zea Mays* L. Shoot Tissue—John R. Chisnell*

284 Response to Gravity by *Zea mays* Seedlings. I. Time Course of the Response—Robert S. Bandurski*, A. Schulze, P. Dayanandan, and P. B. Kaufman

289 Azido Auxins. Photolysis in Solution and Covalent Binding to Soybean—L. Lee Melhado, Alan M. Jones, T.-H. David Ho, and Nelson J. Leonard*

295 Azido Auxins. Quantitative Binding Data in Maize—Alan M. Jones, L. Lee Melhado, T.-H. David Ho, and Nelson J. Leonard*

302 IAA-Induced Growth Responses of Decapitated Corn Seedlings. Indications of Two Apparent Adaptations with a Possible Role in Gravitropism—Ronald D. Hatfield* and Clifford E. LaMotte

307 Interrelationship of Gene Expression, Polysome Prevalence, and Respiration during Ripening of Ethylene and/or Cyanide-Treated Avocado Fruit—Mark T. Tucker and George G. Laties*

316 Comparison of Water Potentials Measured by *In Situ* Psychrometry and Pressure Chamber in Morphologically Different Species—Neil C. Turner*, R. A. Spurway, and E.-D. Schulze

320 Occurrence of 4-Cl-Indoleacetic Acid in Broad Beans and Correlation of Its Levels with Seed Development—Tanja Pless, Michael Böttger*, Peter Hedden, and Jan Graebe

324 A Debranching Enzyme Deficiency in Endosperms of the *Sugary-1* Mutants of Maize—David Pan and Oliver E. Nelson*

329 Role of Amides, Amino Acids, and Ureides in the Nutrition of Developing Soybean Seeds—Ross M. Rainbird, John H. Thorne*, and Ralph W. F. Hardy

335 Auxin Concentration/Growth Relationship for *Avena* Coleoptile Sections from Seedlings Grown in Complete Darkness—James R. Shinkle* and Winslow R. Briggs

340 Plant Triose Phosphate Isomerase Isozymes. Purification, Immunological and Structural Characterization, and Partial Amino Acid Sequences—Eran Pichersky and Leslie D. Gottlieb*

348 Use of Zinc Ions To Study Thylakoid Protein Phosphorylation and the State 1-State 2 Transition *In Vitro*—John P. Markwell*, Neil R. Baker, Michael Bradbury, and J. Philip Thornber

355 Is the Cytosolic Pi Concentration a Limiting Factor for Plant Cell Respiration?—Fabrice Rebeille, Richard Bligny, and Roland Douce*

360 Differential Senescence of Maize Hybrids following Ear Removal. I. Whole Plant—Steven J. Crafts-Brandner, Frederick E. Below, James E. Harper, and Richard H. Hageman*

368 Differential Senescence of Maize Hybrids following Ear Removal. II. Selected Leaf—Steven J. Crafts-Brandner, Frederick E. Below, Vernon A. Wittenbach, James E. Harper, and Richard H. Hageman*

374 Spinach Pyruvate Kinase Isoforms. Partial Purification and Regulatory Properties—Chris Baysdorfer* and James A. Bassham

380 Aging of Cylinders Excised from Pulp Tissues of the 'Golden Delicious' Apple—Claude Hartmann*, Alain Drouet, François Cormier, Claude Nivet, and

Christine Rigault

385 **Polyamine Biosynthetic Enzymes in the Cell Cycle of *Chlorella*. Correlation between Ornithine Decarboxylase and DNA Synthesis at Different Light Intensities**—Ephraim Cohen, Shoshana (Malis) Arad, Yair H. Heimer, and Yosef Mizrahi*

389 **Endosperm Protein Synthesis and L-[^{35}S]Methionine Incorporation in Maize Kernels Cultured *In Vitro***—David E. Cully, Burle G. Gengenbach*, Jane A. Smith, Irwin Rubenstein, James A. Connelly, and William D. Park

395 **Kinetic Properties of Pyrophosphate:Fructose-6-Phosphate Phosphotransferase from Germinating Castor Bean Endosperm**—Erich Kombrink, Nicholas J. Kruger, and Harry Beevers*

402 **Short Term Acclimation of Spinach to High Temperatures. Effect on Chlorophyll Fluorescence at 293 and 77 Kelvin in Intact Leaves**—Engelbert Weis*

408 **Hormone-Mediated Regulative Action of the Sunflower Shoot Apex on Growth and Cation Level in the Cotyledons. An Additional Manifestation of Apical Control**—Y. Saks and I. Ilan*

413 **Acclimation to High CO_2 in Bean. Carbonic Anhydrase and Ribulose Bisphosphate Carboxylase**—Michael A. Porter and Bernard Grodzinski*

417 **Physiological Responses to Salinity in Selected Lines of Wheat**—Ralph W. Kingsbury, Emanuel Epstein*, and Robert W. Pearcy

424 **Guard Cell Starch Biosynthesis Regulated by Effectors of ADP-Glucose Pyrophosphorylase**—William H. Outlaw Jr.* and Mitchell C. Tarczynski

SHORT COMMUNICATIONS

430 **Histological Compartmentation of Phosphate in *Vicia faba* L. Leaflet. Possible Significance to Stomatal Functioning**—William H. Outlaw Jr.*, Mitchell C. Tarczynski, and William I. Miller

434 **Sink to Source Translocation in Soybean**—Alan B. Bennett*, Barry L. Sweger, and Roger M. Spanswick

437 **Low Temperature Induction of Hormonal Sensitivity in Genotypically Gibberellic Acid-Insensitive Aleurone Tissue**—Surinder Pal Singh and Leslie G. Paleg*

439 **Kaurene Synthetase Activity in *Helianthus annuus* L. Increases in Enzyme Activity after Storage of Seedlings in Liquid Nitrogen**—Jane Shen-Miller* and Charles A. West

442 **Vacuolar Localization of Ethylene-Induced Chitinase in Bean Leaves**—Thomas Boller* and Urs Vögeli

445 **Evidence for Control of Carbon Partitioning by Fructose 2,6-Bisphosphate in Spinach Leaves**—Steven C. Huber* and D. Mark Bickett

448 **Multiple Subunit Composition of Chloroplastic Glutamine Synthetase of *Nicotiana tabacum* L.**—Bertrand Hirel*, Claire Weatherley, Claude Cretin, Catherine Bergounioux, and Pierre Gadal

451 **Effective Absorption Cross-Sections in *Porphyridium cruentum*. Implications for Energy Transfer between Phycobilisomes and Photosystem II Reaction Centers**—Arthur C. Ley*

455 **Quantitation of Oat Globulin by Radioimmunoassay**—Tracey E. Colyer and Dawn S. Luthe*

457 **Correction**

Number 3. March

459 **Starch Degradation in Synchronously Grown *Chlamydomonas reinhardtii* and Characterization of the Amylase**—Carolyn Levi* and Martin Gibbs

464 **Determination of Solute Permeability in *Chara* Internodes by a Turgor Minimum Method. Effects of External pH**—Stephen D. Tyerman and Ernst Steudle*

469 **Atrazine, Bromacil, and Diuron Resistance in *Chlamydomonas*. A Single Non-Mendelian Genetic Locus Controls the Structure of the Thylakoid Binding Site**—Ruth E. Galloway and Laurens J. Mets*

475 **Effects of Ultraviolet-B Irradiance on Soybean. V. The Dependence of Plant Sensitivity on the Photosynthetic Photon Flux Density during and after Leaf Expansion**—Roman M. Mirecki and Alan H. Teramura*

481 **Comparative Studies of Fluorescence from Mesophyll and Guard Cell Chloroplasts in *Saxifraga cernua*. Analysis of Fluorescence Kinetics as a Function of Excitation Intensity**—Bruce T. Mawson, Angus Franklin, W. Gary Filion, and W. Raymond Cummins*

487 **Characterization of Radish (*Raphanus sativus*) Storage Proteins**—Monique Laroche, Lorette Aspart, Michel Delseny*, and Paul Penon

494 **Degradation of the Major Storage Protein of *Phaseolus vulgaris* during Germination. Role of Endogenous Proteases and Protease Inhibitors**—S. Suzanne Nielsen and Irvin E. Liener*

499 **Spontaneous Phloem Bleeding from Cryopunctured Fruits of a Ureide-Producing Legume**—John S. Pate*, Mark B. Peoples, and Craig A. Atkins

506 **Proteins Produced during Salt Stress in Tobacco Cell Culture**—Mary C. Ericson* and Sharon H. Alfinito

510 **Invertases of *Lilium* Pollen. Characterization and Activity during *In Vitro* Germination**—Mohan B. Singh* and R. Bruce Knox

516 **Biosynthesis of Storage Proteins in Ripening *Agrostemma githago* L. Seeds**—Geert Jan de Klerk*

525 **Nonphysiological Binding of Ethylene by Plants**—Fred B. Abeles*

529 **Graviresponsiveness and the Development of Columella Tissue in Primary and Lateral Roots of *Ricinus communis***—Randy Moore* and John Pasieniuk

534 ***cis*-Polyisoprene Synthesis in Guayule Plants (*Parthenium argentatum* Gray) Exposed to Low, Nonfreezing Temperatures**—Rachel A. Goss, Chauncy R. Benedict*, James H. Keithly, Craig L. Nessler, and Robert D. Stipanovic

538 **H^+-ATPase Activity from Storage Tissue of *Beta vulgaris*. I. Identification and Characterization of an Anion-Sensitive H^+-ATPase**—Alan B. Bennett*, Sharman D. O'Neill, and Roger M. Spanswick

545 **H^+-ATPase Activity from Storage Tissue of *Beta vulgaris*. II. H^+/ATP Stoichiometry of an Anion-Sensitive H^+-ATPase**—Alan B. Bennett* and Roger M. Spanswick

549 **Density Gradient Localization of Plasma Membrane and Tonoplast from Storage Tissue of Growing and Dormant Red Beet. Characterization of Proton-Transport and ATPase in Tonoplast Vesicles**—Ronald J. Poole*, Donald P. Briskin, Zdeněk Krátký, and Rose M. Johnstone

557 **Isotope Ratios of Cellulose from Plants Having Different Photosynthetic Pathways**—Leonel O. Sternberg, Michael J. DeNiro, and Hyrum B. Johnson*

562 **Structure of the Arabinogalactan from *Zea* Shoots**—Yoji Kato and Donald J. Nevins*

569 **Purification, Characterization, and Fractionation of the δ-Aminolevulinic Acid Synthesizing Enzymes from**

Light-Grown *Chlamydomonas reinhardtii* Cells—Wei-Yeh Wang*, Ding-Ding Huang, Deborah Stachon, Simon P. Gough, and C. Gamini Kannangara

576 **Effects of Exogenous Methionine on Storage Protein Composition of Soybean Cotyledons Cultured *In Vitro***—Lorraine P. Holowach*, John F. Thompson, and James T. Madison

584 **Storage Protein Composition of Soybean Cotyledons Grown *In Vitro* in Media of Various Sulfate Concentrations in the Presence and Absence of Exogenous L-Methionine**—Lorraine P. Holowach*, John F. Thompson, and James T. Madison

590 **Carbohydrate Metabolism in Leaf Meristems of Tall Fescue. I. Relationship to Genetically Altered Leaf Elongation Rates**—Jeffrey J. Volenec and Curtis J. Nelson*

595 **Carbohydrate Metabolism in Leaf Meristems of Tall Fescue. II. Relationship to Leaf Elongation Rates Modified by Nitrogen Fertilization**—Jeffrey J. Volenec and Curtis J. Nelson*

601 **Phytochrome Intermediates and Action Spectra for Light Perception by Dry Seeds**—Michael R. Bartley* and Barry Frankland

605 **Asparagine Biosynthesis in Soybean Nodules**—Thomas A. Huber* and John G. Streeter

611 **Solubilization and Partial Purification of ATPase from a Rose Cell Plasma Membrane Fraction**—Catherine W. Imbrie and Terence M. Murphy*

617 **Photoinactivation of Detergent-Solubilized Plasma Membrane ATPase from *Rosa damascena*. Action Spectra**—Catherine W. Imbrie and Terence M. Murphy*

622 **Control of Lipid Synthesis during Soybean Seed Development: Enzymic and Immunochemical Assay of Acyl Carrier Protein**—John B. Ohlrogge* and Tsung-Min Kuo

626 **Changes in Cytokinins and Gibberellin-Like Substances in *Pinus radiata* Buds during Lateral Shoot Initiation and the Characterization of Ribosyl Zeatin and a Novel Ribosyl Zeatin Glycoside**—John S. Taylor, Masaji Koshioka, Richard P. Pharis*, and Geoffrey B. Sweet

632 **Measurement of Mitochondrial ATPase Activity in Maize Root Tips by Saturation Transfer ^{31}P Nuclear Magnetic Resonance**—Justin K. M. Roberts*, David Wemmer, and Oleg Jardetzky

640 **Characterization of Cultured Tobacco Cell Lines Resistant to Ethionine, a Methionine Analog**—Robert A. Gonzales, Prakash K. Das, and Jack M. Widholm*

645 **Propylamine Transferases in Chinese Cabbage Leaves**—Ram K. Sindhu and Seymour S. Cohen*

650 **Isolation and Characterization of a Light-Harvesting Chlorophyll *a/b* Protein Complex Associated with Photosystem I**—Eric Lam, William Oritz, Stephen Mayfield, and Richard Malkin*

656 **Spore Germination and Rhizoid Differentiation in *Onoclea sensibilis*. A Two-Dimensional Electrophoretic Analysis of the Extant Soluble Proteins**—Clark S. Huckaby* and John H. Miller

663 **Frequency of N^6-Benzyladenine Incorporation into Major RNA Fractions of Tobacco Cell Suspensions Grown at Stimulatory or Cytostatic Cytokinin Concentration**—Jean-Pierre Jouanneau, Bernard Teyssendier de la Serve*, and Claude Péaud-Lenoël

669 **Incorporation of N^6-Benzyladenine into Messenger Poly(A)-RNA of Tobacco Cells Incubated at Stimulatory or Cytostatic Cytokinin Concentration**—Bernard Teyssendier de la Serve*, Jean-Pierre Jouanneau, and Claude Péaud-Lenoël

675 **A Seed Storage Protein with Possible Self-Affinity through Lectin-Like Binding**—Pat J. Langston-Unkefer* and Wayne Gade

681 **Activation State of Ribulose Bisphosphate Carboxylase in Soybean Leaves**—Jerome C. Servaites* and Rebecca S. Torisky

687 **Structure of the Primary Cell Walls of Suspension-Cultured *Rosa glauca* Cells. I. Polysaccharides Associated with Cellulose**—Gérard Chambat, Fernand Barnoud, and Jean-Paul Joseleau*

694 **Structure of the Primary Cell Walls of Suspension-Cultured *Rosa glauca* Cells. II. Multiple Forms of Xyloglucans**—Jean-Paul Joseleau* and Gérard Chambat

701 ***In Vivo* Nitrogenase Regulation by Ammonium and Methylamine and the Effect of MSX on Ammonium Transport in *Anabaena flos-aquae***—David H. Turpin*, Scott A. Edie, and David T. Canvin

705 **Effects of Glycolate Pathway Intermediates on Glycine Decarboxylation and Serine Synthesis in Pea (*Pisum sativum* L.)**—Richard Shingles, Lorna Woodrow, and Bernard Grodzinski*

711 **ADPglucose Pyrophosphorylase from the CAM Plants *Hoya carnosa* and *Xerosicyos danguyi***—Bijay K. Singh, Elaine Greenberg, and Jack Preiss*

717 **Variation in Photosynthetic Pigments and Plastoquinone Contents in Sugar Beet Chloroplasts with Changes in Leaf Copper Content**—Magdolna Droppa, Norman Terry*, and Gabor Horvath

721 **Uronide Deposition Rates in the Primary Root of *Zea mays***—Wendy Kuhn Silk, Robert C. Walker, and John Labavitch*

727 **Accumulation of Plastoquinone A during Low Temperature Growth of Winter Rye**—Marilyn Griffith*, Beverly Elfman, and Edith L. Camm

730 **Regulation of K^+ Influx in Barley. Effects of Low Temperature**—M. Yaeesh Siddiqi*, Abdul R. Memon, and Anthony D. M. Glass

735 **Freeze-Fracture Ultrastructure of Thylakoid Membranes in Chloroplasts from Manganese-Deficient Plants**—David J. Simpson and Simon P. Robinson*

SHORT COMMUNICATIONS

742 **A Highly Active Oxygen-Evolving Photosystem II Preparation from the Cyanobacterium *Anacystis nidulans***—Hi.nadri B. Pakrasi and Louis A. Sherman*

746 **Ability of Pollen to Germinate prior to Anthesis and Effect of Desiccation on Germination**—Jih-Jing Lin* and David B. Dickinson

Number 4. April

749 **Chloroplast Ultrastructure, Chlorophyll Fluorescence, and Pigment Composition in Chilling-Stressed Soybeans**—Robert L. Musser*, Shirley A. Thomas, Robert R. Wise, Thomas C. Peeler, and Aubrey W. Naylor

755 **Tetranitromethane Oxidation of Phytochrome Chromophore as a Function of Spectral Form and Molecular Weight**—Tae-Ryong Ha n, Pill-Soon Song*, Peter H. Quail, and Richard D Vierstra

759 **Differences between Wheat Genotypes in Specific Activity of Ribulose-1,5-bisphosphate Carboxylase and the Relationship to Photosynthesis**—John R. Evans* and Jeffrey R. Seemann

766 **Purification and Characterization of a Glycerol-Resistant**

CF_0-CF_1 and CF_1-ATPase from the Halotolerant Alga *Dunaliella bardawil*—Moshe Finel, Uri Pick*, Susanne Selman-Reimer, and Bruce R. Selman

773 Properties of Lectins in the Root and Seed of *Lotononis bainesii*—Ian J. Law and Barend W. Strijdom*

779 Role of Lectins in the Specific Recognition of *Rhizobium* by *Lotononis bainesii*—Ian J. Law and Barend W. Strijdom*

786 Tolerance of Photosynthesis to High Temperature in Desert Plants—W. John S. Downton, Joseph A. Berry*, and Jeffrey R. Seemann

791 Variations in the Specific Activity of Ribulose-1,5-bisphosphate Carboxylase between Species Utilizing Differing Photosynthetic Pathways—Jeffrey R. Seemann*, Murray R. Badger, and Joseph A. Berry

795 *De Novo* Maltotriose Biosynthesis from the Reducing End by *Spinacia oleracea* L. Chloroplasts—James C. Linden* and N. Schilling

800 Soybean Leaf Urease: A Seed Enzyme?—Joseph C. Polacco* and Rodney G. Winkler

804 *Helminthosporium maydis* T Toxin Decreased Calcium Transport into Mitochondria of Susceptible Corn—Anne Kimber and Heven Sze*

810 Abscisic Acid Metabolism by Source and Sink Tissues of Sugar Beet—Jaleh Daie*, Roger Wyse, Mich Hein, and Mark L. Brenner

815 Imbibitional Chilling Injury in Pollen. Involvement of the Respiratory Chain—Folkert A. Hoekstra*

822 Amino Acid Metabolism in Pea Leaves. Utilization of Nitrogen from Amide and Amino Groups of [^{15}N] Asparagine—Trung Chanh Ta, Kenneth W. Joy*, and Robert J. Ireland

827 Modulation of Oat Mitochondrial ATPase Activity by Ca^{2+} and Phytochrome—Bruce S. Serlin*, Sudhir K. Sopory, and Stanley J. Roux

834 Purification and Comparative Characterization of an Enolase from Spinach—Sukanto Sinha and John M. Brewer*

841 Regulation of α-Amylase Activity in Bean Stem Tissues—Bill D. Davis*

846 Peroxidase Release Induced by Ozone in *Sedum album* Leaves. Involvement of Ca^{2+}—Federico J. Castillo*, Claude Penel, and Hubert Greppin

852 Hydrogen Peroxide-Dependent Oxidation of Flavonols by Intact Spinach Chloroplasts—Umeo Takahama*

856 Purification and Properties of Spinach Leaf Debranching Enzyme—Isabella Ludwig, Paul Ziegler, and Erwin Beck*

862 Xylem Development in *Prunus* Flower Buds and the Relationship to Deep Supercooling—Edward N. Ashworth*

866 Intercellular Localization of Assimilatory Sulfate Reduction in Leaves of *Zea mays* and *Triticum aestivum*—D. Schmutz and C. Brunold*

871 Enhancement of Ethylene Release from Leaf Tissue during Glycolate Decarboxylation. A Possible Role for Photorespiration—Bernard Grodzinski*

877 Kaempferol Glycosides and Enzymes of Flavonol Biosynthesis in Leaves of a Soybean Strain with Low Photosynthetic Rates—Eric G. Cosio and Jerry W. McClure*

882 Transpiration- and Growth-Induced Water Potentials in Maize—Mark E. Westgate* and John S. Boyer

890 Rates and Products of Long-Chain Fatty Acid Synthesis from [1-^{14}C]Acetate in Chloroplasts Isolated from Leaves of 16:3 and 18:3 Plants—Susan E. Gardiner*, Ernst Heinz, and P. Grattan Roughan

897 Photocontrol of Hypocotyl Elongation in De-Etiolated *Cucumis sativus* L. Long Term, Fluence Rate-Dependent Responses to Blue Light—Victor Gaba*, Michael Black, and Terry H. Attridge

901 Endoplasmic Reticulum as a Site of Phenylpropanoid and Flavonoid Metabolism in *Hippeastrum*—George J. Wagner* and Geza Hrazdina

907 Naturally Occurring Protein Crystals in the Potato. Inhibitor of Papain, Chymopapain, and Ficin—Panayotis Rodis and Johan E. Hoff*

912 Electric Currents around Growing *Trichoderma* Hyphae, before and after Photoinduction of Conidiation—Benjamin A. Horwitz, Manfred H. Weisenseel, Alfred Dorn, and Jonathan Gressel*

917 Plant Desiccation and Protein Synthesis. V. Stability of Poly(A)$^-$ and Poly(A)$^+$ RNA during Desiccation and Their Synthesis upon Rehydration in the Desiccation-Tolerant Moss *Tortula ruralis* and the Intolerant Moss *Cratoneuron filicinum*—Melvin J. Oliver and J. Derek Bewley*

923 Plant Desiccation and Protein Synthesis. VI. Changes in Protein Synthesis Elicited by Desiccation of the Moss *Tortula ruralis* Are Effected at the Translational Level—Melvin J. Oliver and J. Derek Bewley*

928 Formation of Mg-Containing Chlorophyll Precursors from Protoporphyrin IX, δ-Aminolevulinic Acid, and Glutamate in Isolated, Photosynthetically Competent, Developing Chloroplasts—Thomas P. Fuesler, Paul A. Castelfranco*, and Yum-Shing Wong

934 Accumulation and Transport of Abscisic Acid and Its Metabolites in *Ricinus* and *Xanthium*—Jan A. D. Zeevaart* and Gregory L. Boyer

940 Characterization of the Increased Lysophospholipase Activity in Gibberellic Acid-Treated Barley Aleurone Layers—Robert P. Lundgard and Derek J. Baisted*

944 Heat Stress Responses in Cultured Plant Cells. Effect of Culture Handling and Age—Min-Tze Wu, Stephen J. Wallner*, and John W. Waddell

947 Development of Nitrogen Assimilation Enzymes during Photoautotrophic Growth of *Chenopodium rubrum* Suspension Cultures—Wilbur H. Campbell*, Paul Ziegler, and Erwin Beck

951 Effect of Plant Hormones on Sucrose Uptake by Sugar Beet Root Tissue Discs—Robert A. Saftner* and Roger E. Wyse

956 Permeability of Chloroplast Envelopes to Mg^{2+}. Effects on Protein Synthesis—Raymond J. Deshaies, Leonard E. Fish, and Andre T. Jagendorf*

962 Characteristics of Light-Dependent Inorganic Carbon Uptake by Isolated Spinach Chloroplasts—Richard C. Sicher*

967 Chloroplast Structure and Starch Grain Accumulation in Leaves That Received Different Red and Far-Red Levels during Development—Michael J. Kasperbauer* and James L. Hamilton

971 Ontogenetic Changes in the Transport of Indol-3yl-acetic Acid into Maize Roots from the Shoot and Caryopsis—Hilary V. Martin and Malcolm C. Elliott*

975 Polyamine Metabolism and Its Relation to Response of the Aleurone Layers of Barley Seeds to Gibberellic Acid—Paul P. C. Lin*

984 Reduction of Ferric Leghemoglobin in Soybean Root Nodules—Keuk-Ki Lee and Robert V. Klucas*

989 Characteristics of Galacturonic Acid Oligomers as Elicitors of Casbene Synthetase Activity in Castor Bean Seedlings—Donald F. Jin and Charles A. West*

993 Photosystem Electron-Transport Capacity and Light-Harvesting Antenna Size in Maize Chloroplasts—Maria L. Ghirardi and Anastasios Melis*

999 Phytotoxicity of Air Pollutants. Evidence for the Photodetoxification of SO_2 but Not O_3—David M. Ol-

szyk* and David T. Tingey

1006 Synthesis of the Crystalloid Protein Complex *In Vivo* in the Endosperm of Developing Castor Bean Seeds—David J. Gifford* and J. Derek Bewley

1010 Osmoregulation in the Extremely Euryhaline Marine Micro-Alga *Chlorella autotrophica*—Iftikhar Ahmad and Johan A. Hellebust*

1016 Temperature-Dependent Phase Behavior of Phosphatidylglycerols from Chilling-Sensitive and Chilling-Resistant Plants—Norio Murata* and Jun Yamaya

1025 Isolation and Partial Purification of Cadmium-Binding Protein from Roots of the Grass *Agrostis gigantea*—Wilfried E. Rauser*

1030 Enzymes of Sucrose Breakdown in Soybean Nodules. Alkaline Invertase—Matthew Morell and Les Copeland*

1035 Inactivation of Phenylglyoxal of the Specific Binding of 1-Naphthyl Acetic Acid with Membrane-Bound Auxin Binding Sites from Maize Coleoptiles—Jean-François Nave* and Pierre Benveniste

1041 Differences in Water Relations and Physiological Characteristics in Leaves of Wheat Associated with Leaf Position on the Plant—Pramod K. Aggarwal and Suresh K. Sinha*

1046 Ultrasonic Acoustic Emissions from the Sapwood of *Thuja occidentalis* Measured inside a Pressure Bomb—Melvin T. Tyree*, Michael A. Dixon, and Robert G. Thompson

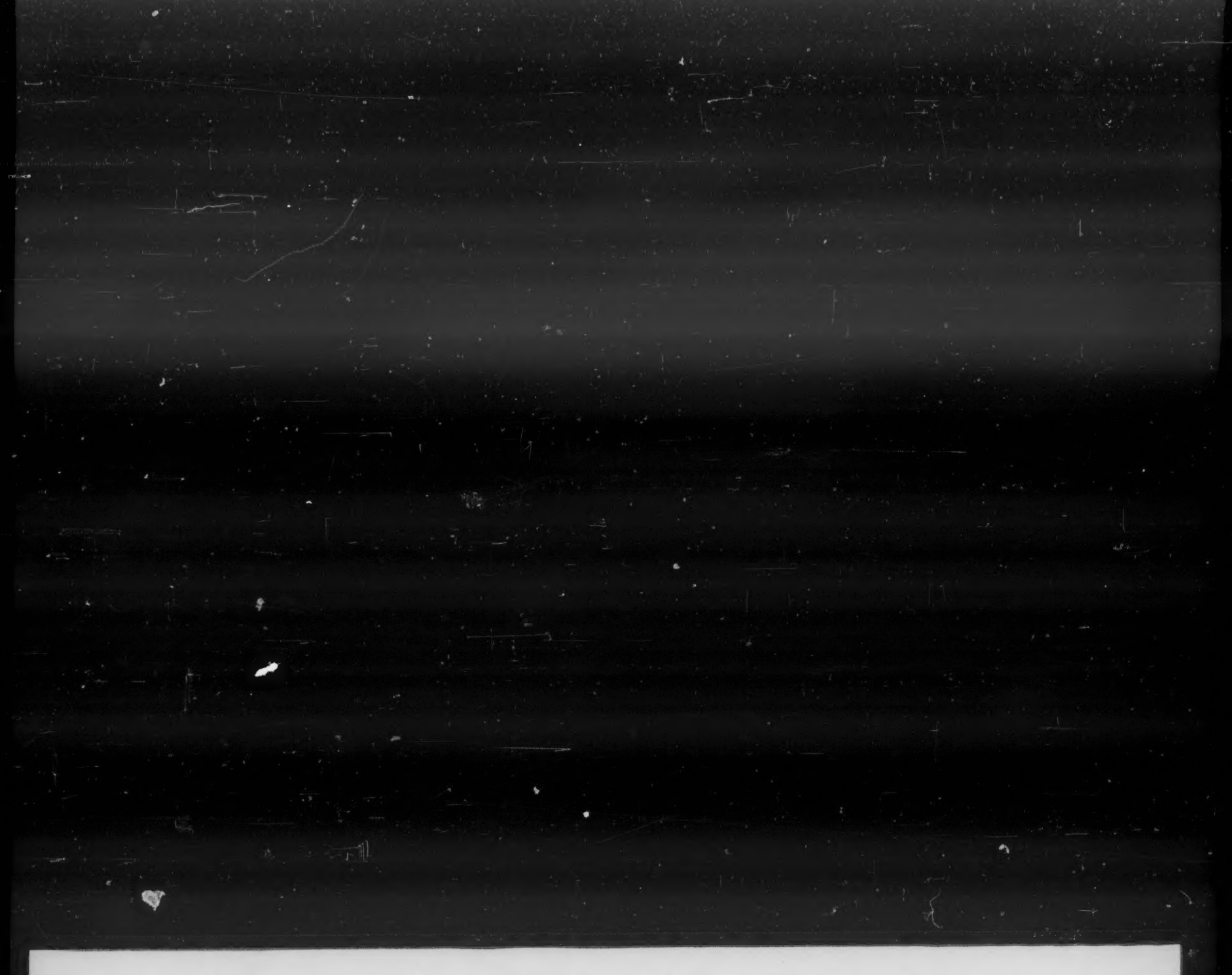
1050 Characterization of Early Morning Crassulacean Acid Metabolism in *Opuntia erinacea* var Columbiana (Griffiths) L. Benson—Robert O. Littlejohn* and Maurice S. B. Ku

SHORT COMMUNICATION

1055 Role of Seagrass Photosynthesis in Root Aerobic Processes—Robert D. Smith, William C. Dennison, and Randall S. Alberte*

1059 Corrections

iii Volume Contents
ix Volume Author Index
xii Volume Subject Index



Plant Physiol. (1984) 74, ix–xi
0032-0889/84/74/ix/03/$01.00/0

Author Index

A

Abeles, Fred B., 525
Acklin, W., 117
Aggarwal, Pramod K., 1041
Ahmad, Iftikhar, 1010
Albersheim, Peter, 52
Alberte, Randall S., 1055
Alfinito, Sharon H., 506
Anderson, James D., 99
Arad, Shoshana (Malis), 385
Arigoni, D., 117
Ashworth, Edward N., 862
Aspart, Lorette, 487
Atkins, Craig A., 499
Attridge, Terry H., 897

B

Badenoch-Jones, Jane, 239
Badger, Murray R., 791
Baisted, Derek J., 940
Baker, Neil R., 348
Ball, Marilyn C., 1, 7
Bandurski, Robert S., 284
Barnoud, Fernand, 687
Bartholomew, Dolores, 252
Bartley, Michael R., 601
Bassham, James A., 189, 374
Baysdorfer, Chris, 374
Beale, Samuel I., 146
Beck, Erwin, 856, 947
Beevers, Harry, 395
Bellville, Robert J., 128
Below, Frederick E., 360, 368
Benedict, Chauncey R., 534
Bennett, Alan B., 434, 538, 545
Benveniste, Pierre, 1035
Bergounioux, Catherine, 448
Berry, Joseph A., 786, 791
Bewley, J. Derek, 21, 917, 923, 1006
Bickett, D. Mark, 445
Bingham, Gail E., 233
Bisson, Mary A., 252
Black, Michael, 897
Bligny, Richard, 355
Blumwald, Eduardo, 183
Bohlool, B. Ben., 72
Boller, Thomas, 442
Böttger, Michael, 320
Boyer, Gregory L., 934
Boyer, John S, 161
Boyer, John S., 882
Bradbury, Michael, 348
Brenner, Mark L., 810
Brewer, John M., 834
Briggs, Winslow R., 335
Briskin, Donald P., 549
Brunold, C., 866

C

Camara, Bilal, 112
Camm, Edith L., 727
Campbell, Wilbur H., 947
Canvin, David T., 701
Cass, Alfred, 96
Casselton, Peter J., 204
Castelfranco, Paul A., 928
Castillo, Federico J., 846
Chalutz, Edo, 99
Charpbat, Gérard, 687, 694
Chisnell, John R., 278
Cohen, Ephraim, 385
Cohen, Seymour S., 645
Colyer, Tracey E., 455
Connelly, James A., 389
Copeland, Les, 1030
Cordonnier, Marie-Michèle, 123
Cormier, François, 380
Cosio, Eric G., 877
Crafts-Brandner, Steven J., 360, 368
Cretin, Claude, 448
Cully, David E., 389
Cummins, W. Raymond, 481
Cure, Jennifer D., 233

D

Daie, Jaleh, 810
D'Alton, Annie, 39
Daly, J. M., 117
Darvill, Alan G., 52
Das, Prakash K., 640
Davis, Bill D., 841
Davis, Keith R., 52
Dayanandan, P., 284
de Klerk, Geert Jan, 516
de la Serve, Bernard Teyssendier, 663. 669
Delseny, Michel, 487
DeNiro, Michael J., 557
Deniro, Michael J., 104
Dennison, William C., 1055
Deshaies, Raymond J., 956
Dickinson, David B., 746
Dixon, Michael A., 1046
Dorn, Alfred, 912
Douce, Roland, 355
Downton, W. John S., 786
Droppa, Magdolna, 717
Drouet, Alain, 380
Durand, Bernard, 139
Duvick, Jonathan P., 117

E

Edie, Scott A., 701
Elfman, Beverly, 727
Elliott, Malcolm C., 971
Elthon, Thomas E., 213
Epstein, Emanuel, 417
Ericson, Mary C., 506
Espelie, Karl E., 256
Etherton, Bud, 39
Evans, John R., 759

F

Farquhar, Graham D., 1, 7
Feldman, Lewis J., 208
Felker, Frederick C., 43
Filion, W. Gary, 481
Finel, Moshe, 766
Fish, Leonard E., 956
Francke, Jan A., 170
Frankland, Barry, 601
Franklin, Angus, 481
Fuesler, Thomas P., 928

G

Gaba, Victor, 897
Gadal, Pierre, 448
Gade, Wayne, 675
Galloway, Ruth E., 469
Gardiner, Susan E., 890
Gee, Sherry L., 189
Gengenbach, Burle G., 389
Gerster, Richard, 108
Ghirardi, Maria L., 993
Gibbs, Martin, 459
Gifford, David J., 1006
Gildow, Viqui, 208
Glass, Anthony D. M., 730
Gonzales, Robert A., 640
Goodenough, Peter, 32
Goss, Rachel A., 534
Gottlieb, Leslie D., 340
Gough, Simon P., 569
Graebe, Jan, 320
Greenberg, Elaine, 711
Greppin, Hubert, 123, 846
Gressel, Jonathan, 912
Grier, Charles C., 77
Grierson, Donald, 32
Griffith, Marilyn, 727
Grodzinski, Bernard, 413, 705, 871
Guerin, B., 139
Guikema, James A., 90

H

Hageman, Richard H., 360, 368
Hahn, Tae-Ryong, 755
Halverson, Larry J., 84
Hamilton, James L., 967
Hardy, Ralph W. F., 329
Harper, James E., 360, 368
Hart, James W., 272
Hartmann, Claude, 380
Hatfield, Ronald D., 302
Hedden, Peter, 320
Heimer, Yair H., 385
Hein, Mich, 810
Heinz, Ernst, 890
Hellebust, Johan A., 1010
Hendrix, Donald L., 16
Hinckley, Thomas M., 77
Hirel, Bertrand, 448
Ho, T.-H. David, 289, 295
Hoekstra, Folkert A., 815
Hoff, Johan E., 907
Holbrook, Gabriel P., 12
Holowach, Lorraine P., 576, 584
Horvath, Gabor, 717
Horwitz, Benjamin A., 912
Hrazdina, Geza, 901
Huang, Ding-Ding, 569
Huber, Steven C., 445
Huber, Thomas A., 605
Huckaby, Clark S., 656

I

Ilan, I., 408
Imbrie, Catherine W., 611, 617
Ireland, Robert J., 822

J

Jagendorf, Andre T., 956
Jardetzky, Oleg, 632
Jeffery, David, 32
Jin, Donald F., 989
Johnson, Hyrum B., 557
Johnstone, Rose M., 549
Jolivet-Tournier, Pascale, 108
Jones, Alan M., 289, 295
Joseleau, Jean-Paul, 687, 694
Jouanneau, Jean-Pierre, 663, 669
Joy, Kenneth W., 822

K

Kahlem, G., 139
Kahn, Joseph S., 167
Kannangara, C. Gamini, 569
Kasperbauer, Michael J., 967
Kato, Yoji, 562
Kaufman, P. B., 284
Keithly, James H., 534
Key, Joe L., 152
Keys, Alfred J., 12
Kimber, Anne, 804
Kingsbury, Ralph W., 417
Klucas, Robert V., 984
Knox, R. Bruce, 510
Kolattukudy, P. E., 256
Kombrink, Erich, 395
Koshioka, Masaji, 626
Kraayenhof, Ruud, 170
Kratky, Z., 117
Krátký, Zdeněk, 549
Krauss, Friedrich, 176
Kruger, Nicholas J., 395
Ku, Maurice S. B., 1050
Kuo, Tsung-Min, 622

L

Labavitch, John, 721
Lam, Eric, 650
LaMotte, Clifford E., 302
Langston-Unkefer, Pat J., 675
Laroche, Monique, 487
LaRue, Thomas A., 227
Laties, George G., 307
Law, Ian J., 773, 779
Lee, Keuk-ki, 984
Leech, Rachel M., 12
Lem, Nora W., 134
Leonard, Nelson J., 289, 295
Letham, David S., 239
Levi, Carolyn, 459
Ley, Arthur C., 451
Liener, Irvin E., 494
Lin, Chu-Yung, 152
Lin, Jih-Jing, 746
Lin, Paul P. C., 975
Lin, Willy, 219
Linden, James C., 795
Littlejohn, Robert O., 1050
Lucas, William J., 61
Ludwig, Isabella, 856
Lundgard, Robert P., 940
Luthe, Dawn S., 455
Lynch, Daniel V., 193, 198
Lyon, Gary D., 52

M

Macdonald, Ian R., 272
Macko, V., 117
Madison, James T., 576, 584
Malkin, Richard, 650
Manodori, Annamaria, 67
Markhart, III, Albert H., 81
Markwell, John P., 348
Martin, Hilary V., 971
Matthews, Mark A, 161
Mattoo, Autar K., 99
Mawson, Bruce T., 481
Mayfield, Stephen, 650
McClure, Jerry W., 877
McNally, Sheila F., 204
McNeil, David L., 227
Melhado, L. Lee, 289, 295
Melis, Anastasios, 67, 993
Memon, Abdul R., 730
Mets, Laurens J., 469
Miller, John H., 656
Miller, William I., 430
Mirecki, Roman M., 475
Mizrahi, Yosef, 385
Moore, Randy, 529
Morell, Matthew, 1030
Mott, Keith A, 47
Murata, Norio, 1016
Murphy, Terence M., 611, 617
Musser, Robert L., 749

N

Nakashima, Hideaki, 268
Navé, Jean-François, 1035
Naylor, Aubrey W., 749
Nelson, Curtis J., 590, 595
Nelson, Daniel R., 128
Nelson, Oliver E., 43, 324
Nessler, Craig L., 534
Nevins, Donald J., 562
Nielsen, S. Suzanne, 494
Nishimura, Mikio, 261
Nivet, Claude, 380

O

Ohlrogge, John B., 622
O'Leary, James W., 47
Oliver, Melvin J., 21, 917, 923
Olszyk, David M., 999
O'Neill, Sharman D., 538
Oritz, William, 650
Outlaw, William H., Jr., 424, 430

P

Pakrasi, Himadri B., 742
Paleg, Leslie G., 437
Pan, David, 324
Park, William D., 389
Pasieniuk, John, 529
Pate, John S., 499
Pearcy, Robert W., 417
Péaud-Lenoël, Claude, 663, 669
Peeler, Thomas C., 749
Penel, Claude, 846
Penon, Paul, 487
Peoples, Mark B., 499
Peterson, David M., 43
Pharis, Richard P., 626
Pichersky, Eran, 340
Pick, Uri, 766
Pless, Tanja, 320
Polacco, Joseph C., 800
Poole, Ronald J., 549
Porter, Clark A., 128
Porter, Michael A., 413
Pozuelo, José M., 256
Pratt, Lee H., 123
Preiss, Jack, 711
Prosser, Ian, 32

Q

Quail, Peter H., 755

R

Rainbird, Ross M., 329
Rauser, Wilfried E., 1025
Rebeille, Fabrice, 355
Rigault, Christine, 380
Roberts, J. K., 152
Roberts, Justin K. M., 632
Robinson, Simon P., 735
Rodis, Panayotis, 907
Rogers, Hugo H., 233
Rolfe, Barry G., 239
Roughan, P. Grattan, 890
Roux, Stanley J., 827
Rubenstein, Irwin, 389
Ruzin, Steven, 189

S

Saftner, Robert A., 951
Saks, Y., 408
Savage, Michael J., 96
Schäfer, Wolfram, 176
Schilling, N., 795
Schmidt, Ahlert, 176
Schmutz, D., 866
Schrader, Larry E., 26
Schulze, A., 284
Schulze, E.-D., 316
Schuurmans, Jaap J., 170
Secor, Jacob, 26
Seemann, Jeffrey R., 759, 786, 791
Selman, Bruce R., 766
Selman-Reimer, Susanne, 766
Serlin, Bruce S., 827
Servaites, Jerome C., 681
Shen-Miller, Jane, 439
Sherman, Louis A., 90, 742
Shingles, Richard, 705
Shinkle, James R., 335
Sicher, Richard C., 962
Siddiqi, M. Yaeesh, 730
Silk, Wendy Kuhn, 721
Simpson, David J., 735
Sindhu, Ram K., 645
Singh, Bijay K., 711
Singh, Mohan B., 510
Singh, Surinder, 437
Singleton, Paul W., 72
Sinha, Sukanto, 834
Sinha, Suresh K., 1041
Sionit, Nasser, 233
Smith, Christopher, 32
Smith, Jane A., 389
Smith, Joy M., 233
Smith, Robert D., 1055
Solomos, Theo, 99
Song, Pill-Soon, 755
Sopory, Sudhir K., 827
Spanswick, Roger M., 434, 538, 545
Spurway, R. A., 316
Stacey, Gary, 84
Stachon, Deborah, 569
Sternberg, Leonel O., 557
Sternberg, Leonel O'Reilly, 104
Steudle, Ernst, 464
Stewart, Cecil R., 213
Stewart, George R., 204
Stipanovic, Robert D., 534
Streeter, John G., 605
Strijdom, Barend W., 773, 779
Stumpf, Paul K., 134
Sumar, Nazira, 204

Sweet, Geoffrey B., 626
Sweger, Barry L., 434
Sze, Heven, 804

T

Ta, Trung Chanh, 822
Takahama, Umeo, 852
Tanno, Noriaki, 186
Tarczynski, Mitchell C., 424, 430
Taylor, John S., 626
Taylorson, Ray B., 223
Teller, G., 139
Tel-Or, Elisha, 183
Teramura, Alan H., 475
Terry, Norman, 717
Teskey, Robert O., 77
Thomas, Shirley A., 749
Thompson, Guy A., Jr., 193, 198
Thompson, John F., 576, 584
Thompson, Robert G., 1046
Thornber, J. Philip, 348
Thorne, John H., 329
Ting, Irwin P., 104
Tingey, David T., 999
Torisky, Rebecca S., 681
Torres-Pereira, José M. G., 170
Tucker, Mark L., 307
Turner, Neil C., 316
Turpin, David H., 701
Tyerman, Stephen D., 464
Tyree, Melvin T., 1046

V

van Holst, Gerrit-Jan, 247
Varner, Joseph E., 247
Veerman, Enno C. I., 170
Vierstra, Richard D., 755
Vögeli, Urs, 442
Volenec, Jeffrey J., 590, 595

W

Waddell, John W., 944
Wagner, George J., 901
Walker, Robert C., 721
Wallner, Stephen J., 944
Wang, Wei-Yeh, 569
Weatherley, Claire, 448
Weinstein, Jon D., 146
Weis, Engelbert, 402
Weisenseel, Manfred H., 912
Wemmer, David, 632
West, Charles A., 439, 989
Westgate, Mark E., 882
Widholm, Jack M., 640
Wilson, Clyde, 61
Winkler, Rodney G., 800
Wise, Robert R., 749
Wittenbach, Vernon A., 368
Wong, Yum-Shing, 928
Woodrow, Lorna, 705
Wright, John P., 61
Wu, Min-Tze, 944
Wyse, Roger, 810
Wyse, Roger E., 951

Y

Yamaguchi, Junji, 261
Yamaya, Jun, 1016

Z

Zeevaart, Jan A. D., 934
Ziegler, Paul, 856, 947

Plant Physiol. (1984) 74, xii–xvii
0032-0889/84/74/xii/06/$01.00/0

Subject Index

A

Abies amabilis, temperature and water relations, 77
Abscisic acid
  accumulation and transport, *Ricinus/Xanthium*, 934
  chilling and water conductance, soybean, 81
  source/sink tissue metabolism, sugar beet, 810
Absorption cross-sections, *Porphyridium*, 451
Acer pseudoplatanus L. (*see* Sycamore)
Acoustic emissions, pressure bomb measurement, white cedar, 1046
Action spectra
  light perception, *Plantago/Sinapis/Bromus* seed, 601
  plasma membrane ATPase, rose, 617
Acyl carrier protein, seed development, soybean, 622
ADP glucose pyrophosphorylase, *Hoya/Xerosicyos*, 711
Aegiceras corniculatum, photosynthetic response to salinity/humidity, 1
Aging, pulp tissue, apple, 380
Agrostemma githago L., storage protein biosynthesis, 516
Agrostis gigantea, cadmium-binding protein, 1025
Aleurone
  GA_3 and lysophospholipase, barley, 940
  low temperature induction of GA_3 sensitivity, wheat, 437
  polyamine metabolism and GA_3 response, barley, 975
Alkaline invertase, sucrose breakdown, soybean, 1030
Amino acid
  efflux, soybean, 26
  metabolism, pea, 822
Aminolevulinic acid-synthesizing enzymes, *Chlamydomonas*, 569
Ammonium, nitrogenase regulation, *Anabaena*, 701
Amylase
  regulation, bean, 841
  starch degradation, *Chlamydomonas*, 459
Anabaena flos-aquae, nitrogenase regulation by ammonium, 701
Anabaena variabilis, fatty acid synthesis, 134
Anacystis nidulans
  membrane composition, iron deprivation, 90
  O_2-evolving PSII preparation, 742
  photochemical apparatus, 67
Anthesis, germination time and desiccation, lily, 746
Apex
  cotyledonary growth control, sunflower, 408
  shoot geotropism, sunflower, 272
Apium graveolens (*see* Celery)
Apple, pulp tissue aging, 380
Arabinogalactan, corn, 562
Asparagine
  biosynthesis, soybean, 605
  nitrogen utilization, pea, 822
ATP, fusaric acid effects, tomato, 39
ATP synthase complex, glycerol-resistant, *Dunaliella*, 766
ATPase
  cell plasma membrane, rose, 611, 617
  modulation by Ca^{2+} and phytochrome, oat, 827
  root tip mitochondrial activity, maize, 632
  tonoplast, red beet, 549
Atrazine resistance, *Chlamydomonas*, 469
Auxin
  binding site inactivation, maize, 1035
  coleoptile section growth, oat, 335
Avena sativa L. (*see* Oat)
Avicennia marina, photosynthetic response to humidity and salinity, 1
Avocado, ethylene/cyanide-treated fruit ripening, 307
Azido auxin
  binding, soybean/maize, 289, 295
  photolysis, soybean, 289

B

Barley
  GA_3 and lysophospholipase, 940
  K^+ influx regulation and low temperature, 730
  polyamine metabolism and aleurone GA_3 response, 975
  [^{14}C]sucrose uptake and starch labeling, 43
  thioproline and proline metabolism, 213
Bean
  α-amylase activity regulation, 841
  chitinase localization, 442
  ethylene binding, 525
  high CO_2 acclimation, 413
  ribulose-1,5-bisphosphate carboxylase and photosynthetic pathway, 791
  storage protein degradation, 494
N^6-Benzyladenine, incorporation into RNA, tobacco, 663, 669
Beta vulgaris L. (*see* Red beet, Sugar beet)
Binding, azido auxin, soybean/maize, 289, 295
Brassica pekinensis (*see* Chinese cabbage)
Broad bean
  4-Cl-IAA, 320
  ethylene binding, 525
  guard cell starch metabolism, 424
  leaflet Pi, 430
Bromacil resistance, *Chlamydomonas*, 469
Bromus sterilis L., action spectra for light perception, 601

C

C_3/C_4/CAM plants
  cellulose isotope ratios, 104
  isotope ratios, 557
Ca^{2+}, ATPase activity modulation, oat, 827
Cadmium-binding protein, *Agrostis* root, 1025
Calcium
  ionophore A23187, circadian clock, *Neurospora*, 268
  transport, HmT toxin, corn, 804
Capsicum annuum L. (*see* Pepper)
Carbohydrate, leaf meristem metabolism, tall fescue, 590, 595
Carbon
  inorganic uptake, spinach, 962
  isotope ratios, cellulose, C_3/C_4/CAM plants, 104
  partitioning, fructose 2,6-bisphosphate, spinach, 445
Carbon dioxide
  cell growth, *Anacystis*, 67
  exchange, leaf stomata, sunflower/cocklebur, 47
  high level acclimation, bean, 413
  water relations, soybean, 233
Carrot, polyproline II conformation, 247
Carthamus tinctorius, chloroplast fatty acid synthesis, 890
Casbene synthetase activity, castor bean, 989
Castor bean
  ABA/metabolite transport, 934
  crystalloid protein synthesis, 1006
  galacturonic acid oligomers as elicitors, 989
  graviresponse and columella tissue development, 529
  PP_i:fructose-6-phosphate phosphotransferase, 395
Catalase, pumpkin cotyledons, 261
Celery, triose phosphate isomerase isozymes, 340
Cell
  ALA synthesizing enzymes, *Chlamydomonas*, 569
  amino acid efflux, soybean, 26
  chloroplast fluorescence, *Saxifraga*, 481
  growth, CO_2 concentration, *Anacystis*, 67
  heat stress response, pear, 944
  nitrogen assimilation, *Chenopodium*, 947
  plasma membrane ATPase, rose, 611, 617
  primary wall structure, *Rosa*, 687, 694
  pyruvate orthophosphate dikinase, maize, 189
  respiration and Pi, sycamore, 355
  salt-stress proteins, tobacco, 506
  solute permeability, *Chara*, 464
Cell culture, N^6-benzyladenine incorporation, tobacco, 663, 669
Cell cycle, polyamine biosynthetic enzymes, *Chlorella*, 385
Cell line, ethionine resistant, tobacco, 640
Cellulose, isotope ratios, C_3/C_4/CAM plants, 104, 557
Cellulysin-induced ethylene production, tobacco, 99
Chara corallina
  osmoregulation, 252
  plasmalemma transport, 2-[4-(2′,4′-dichlorophenoxy)phenoxy]propionic acid, 61
  solute permeability, 464
Chenopodium quinoa, chloroplast fatty acid synthesis, 890
Chenopodium rubrum, suspension culture nitrogen assimilation, 947
Chilling
  chloroplast responses, soybean, 749
  injury, pollen hydration, *Typha*, 815
  microsomal/chloroplast phospholipid mo-

lecular species, *Dunaliella*, 193, 198
sensitivity, lipid phase behavior, sensitive/resistant plants, 1016
water stress and ABA, soybean, 81
Chinese cabbage, propylamine transferase, 645
Chitinase, vacuolar localization, bean, 442
Chlamydomonas, herbicide resistance, 469
Chlamydomonas reinhardtii
ALA synthesizing enzymes, 569
ribulose-1,5-bisphosphate carboxylase and photosynthetic pathway, 791
starch degradation and amylase, 459
Chlorella autotrophica, osmoregulation, 1010
Chlorella fusca, elemental sulfur formation, 176
Chlorella kessleri, glutamine synthetase isoenzymes, 204
Chlorella vulgaris, polyamine biosynthetic enzymes, cell cycle, 385
Chlorophyll
fluorescence
chilling-stressed soybean, 749
high temperature, spinach, 402
precursor formation, cucumber, 928
Chlorophyll *a/b* protein complex, PSI, 650
Chloroplast
Chl precursor formation, cucumber, 928
coupling factor 1 activation, *Euglena*, 167
envelope permeability, pea, 956
fatty acid synthesis, 16:3/18:3 plants, 890
glutamine synthetase subunit composition, tobacco, 448
glycerol-resistant ATP synthase complex, *Dunaliella*, 766
H_2O_2-dependent flavonol oxidation, spinach, 852
inorganic carbon uptake, spinach, 962
maltotriose biosynthesis, spinach, 795
mesophyll/guard cell fluorescence, *Saxifraga*, 481
photochemical units, maize, 993
pigment/plastoquinone variation and leaf Cu, sugar beet, 717
red/far-red effects, tobacco, 967
responses, chilling-stressed soybean, 749
temperature and energy transduction, spinach, 170
thylakoid freeze-fracture, Mn-deficient spinach, 735
thylakoid protein phosphorylation, tobacco/spinach/pea, 348
Chromophore, oxidation by tetranitromethane, oat, 755
Circadian clock, calcium ionophore A23187, *Neurospora*, 268
Citrus jambhiri, water potential and leaf excision, 96
4-Cl-Indoleacetic acid, broad bean, 320
Cluster amaryllis, chilling sensitivity and membrane lipid phases, 1016
Cocklebur
ABA/metabolite transport, 934
photorespiration and ethylene release, 871
stomata and CO_2 exchange, 47
Coleoptile
auxin and section growth, oat, 335
auxin binding site inactivation, maize, 1035
Columella tissue, graviresponse, castor bean, 529
Conidiation, photoinduced hyphae, and electric current, *Trichoderma*, 912
Cor-
arabinogalactan structure, 562
desiccation and pollen germination, 746
gravitropic adaptation, 302
gravity response, 284
HmT toxin and calcium transport, 804
IAA-*myo*-inositol, 278
light-stimulated protein synthesis, 208
Mg deficiency and suberization, 256
plasmalemma ion transport, 219
uronide deposition rate, 721
Corylus avellana L. (*see* Hazel)
Cotton, sugar uptake, 16
Cotyledon
apical growth control, sunflower, 408
catalase, pumpkin, 261
methionine and storage protein, soybean, 576
sulfate and storage protein, soybean, 584
Coupling factor 1
activation, *Euglena*, 167
glycerol-resistant, *Dunaliella*, 766
Cowpea
fruit phloem bleeding, 499
psychrometry/pressure chamber water potential, 316
Crassulacean acid metabolism, early morning, *Opuntia*, 1050
Cratoneuron filicinum, plant desiccation and protein synthesis, 917
Crown-gall tissue, host genome and cytokinin metabolism, *Mercurialis*, 139
Cryopuncture, fruit phloem bleeding, cowpea, 499
Cucumber
Chl precursor formation, 928
hypocotyl elongation photocontrol, 897
Cucumis sativus L. (*see* Cucumber)
Cucurbita moschata (*see* Squash)
Cucurbita sp. (*see* Pumpkin)
Cyanide, fruit ripening, avocado, 307
Cyanidium caldarium, protoheme and heme *a* synthesis, 146
Cysteine proteinase inhibitor, potato, 907
Cytokinin
lateral shoot initiation, pine, 626
metabolism
host genome, *Mercurialis*, 139
pea, 239

D

Dark, auxin and coleoptile section growth, oat, 335
Daucus carota L. (*see* Carrot)
Debranching enzyme, spinach leaf, 856
Deep supercooling, xylem development, *Prunus*, 862
Desert plants, thermal stability of photosynthesis, 786
Desiccation
pollen germination, lily/corn, 746
protein synthesis
Tortula, 21
Tortula/Cratoneuron, 917, 923
2-[4-(2′,4′-Dichlorophenoxy)phenoxy]propionic acid, plasmalemma transport, *Chara*, 61
Diuron resistance, *Chlamydomonas*, 469
DNA synthesis, ornithine decarboxylase, *Chlorella*, 385
Dunaliella bardawil, glycerol-resistant ATP synthase complex and coupling factor 1, 766
Dunaliella salina, chilling and microsomal/chloroplast phospholipid molecular species, 193, 198

E

Electric current, photoinduced growing hyphae, *Trichoderma*, 912
Electron transport, maize chloroplast, 993
Endoplasmic reticulum, flavonoid metabolism site, *Hippeastrum*, 901
Endosperm
enzyme deficiency, maize, 324
PPi:fructose-6-phosphate phosphotransferase, castor bean, 395
protein synthesis, maize, 389
Energy
transduction, temperature dependence, spinach, 170
transfer, phycobilisome-PSII reaction center, *Porphyridium*, 451
Enolase, spinach, 834
Enzyme deficiency, maize mutant, 324
Erwinia carotovora L., host-pathogen interactions, 52
Ethanol, phytochrome action, *Rumex*, 223
Ethionine resistance, tobacco cell line, 640
Ethylene
binding, plant seedling, 525
fruit ripening, avocado, 307
-induced chitinase, vacuolar localization, bean, 442
production, Cellulysin-induced, tobacco, 99
release and photorespiration, *Xanthium/Salvia*, 871
tomato fruit ripening, 32
Euglena gracilis, coupling factor 1 activation, 167

F

Fatty acid synthesis
Anabaena, 134
16:3/18:3 plants, 890
Festuca arundinacea (*see* Tall fescue)
Flavonoid, metabolism site in ER, *Hippeastrum*, 901
Flavonol
biosynthesis enzymes, soybean, 877
H_2O_2-dependent oxidation, spinach, 852
Flower, xylem development and deep supercooling, *Prunus*, 862
Fluorescence, mesophyll/guard cell chloroplast, *Saxifraga*, 481
Freeze-fracture thylakoid, Mn-deficient spinach, 735
Fructose 2,6-bisphosphate, carbon partitioning, spinach, 445
Fruit
phloem bleeding, cowpea, 499
ripening
biochemistry, tomato, 32
ethylene/cyanide-treated, avocado, 307
Fusaric acid, root hair membrane potential, tomato, 39

G

Galacturonic acid, oligomers as elicitors, castor bean, 989
Gas exchange, mangrove, 1, 7
Gene mutation, herbicide resistance, *Chlamydomonas*, 469
Genotype, meristem carbohydrate metabolism, tall fescue, 590
Geotropism, role of apex, sunflower shoot, 272
Germination
desiccation effects, lily/corn, 746
pollen invertase, lily, 510

Germination—*continued*
storage protein degradation, bean, 494
Gibberellic acid
polyamine metabolism, barley aleurone, 975
sensitivity, low temperature induction, wheat, 437
-treated aleurone, lysophospholipase activity, barley, 940
Globulin quantitation, oat, 455
Glutamate, protoheme and heme *a* synthesis, *Cyanidium*, 146
Glutamine synthetase
isoenzymes, *Chlorella*, 204
subunit composition, tobacco, 448
Glycerol-resistant ATP synthase complex, coupling factor 1, *Dunaliella*, 766
Glycine decarboxylation, serine synthesis, pea, 705
Glycine max L. (*see* Soybean)
Glycolate decarboxylation, ethylene release, *Xanthium/Salvia*, 871
Gossypium hirsutum L. (*see* Cotton)
Graviresponse
columella tissue development, castor bean, 529
corn, 284
Growth
auxin, oat, 335
IAA-induced response, corn, 302
nitrogen assimilation, *Chenopodium*, 947
regulator activity, pine shoot, 626
water potential, maize, 882
Guard cell
chloroplast fluorescence, *Saxifraga*, 481
starch metabolism, broad bean, 424
Guayule, *cis*-polyisoprene synthesis and low temperature, 534

H

H^+-ATPase, tonoplast, red beet, 538, 545
Hazel, psychrometry/pressure chamber water potential, 316
Heat shock protein synthesis, soybean, 152
Helianthus annuus L. (*see* Sunflower)
Helianthus nuttallii (*see* Wild sunflower)
Helminthosporium maydis T toxin, calcium transport, corn, 804
Helminthosporium sacchari, biological activity of toxin, 117
Heme *a*, precursor synthesis, *Cyanidium*, 146
Herbicide resistance, *Chlamydomonas*, 469
Hippeastrum, flavonoid metabolism in ER, 901
Hordeum vulgare L. (*see* Barley)
Hormone, sucrose uptake, sugar beet, 951
Host genome, cytokinin metabolism, *Mercurialis*, 139
Host-pathogen interactions, soybean-*Erwinia*, 52
Host recognition, *Rhizobium*-soybean symbiosis, 84
Hoya carnosa, ADPglucose pyrophosphorylase, 711
Humidity, photosynthetic response, mangrove, 1
Hydration, chilling injury, *Typha* pollen, 815
Hydrogen isotope ratios, cellulose, C_3/C_4/CAM plants, 104
Hydrogen peroxide, flavonol oxidation, spinach, 852
Hyphae, photoinduced growth and electric current, *Trichoderma*, 912
Hypocotyl, elongation photocontrol, cucumber, 897

I

Indole-3-acetic acid
growth response, corn, 302
myo-inositol esters, corn, 278
root transport, maize, 971
Invertase, pollen, lily, 510
Ion transport, NADH-mediated, corn, 219
Ipomoea batata (*see* Sweet potato)
Iron deprivation, membrane composition, *Anacystis*, 90
Isoenzyme, glutamine synthetase, *Chlorella*, 204
Isotope ratios, cellulose, C_3/C_4/CAM plants, 104, 557

K

K^+, influx regulation and low temperature, barley, 730
Kaempferol glycoside, soybean, 877
Kaurene synthetase activity, sunflower, 439

L

Lactuca sativa L. (*see* Lettuce)
Leaf
amino acid metabolism, pea, 822
carbohydrate metabolism, tall fescue, 590, 595
chitinase localization, bean, 442
Cu and pigment/plastoquinone variation, sugar beet, 717
debranching enzyme, spinach, 856
disc, Cellulysin-induced ethylene production, tobacco, 99
excision, water potential, *Citrus*, 96
fatty acid synthesis, 16:3/18:3 plants, 890
fructose 2,6-bisphosphate and carbon partitioning, spinach, 445
glycine to serine conversion, pea, 705
kaempferol glycoside, soybean, 877
ozone-induced peroxidase release, *Sedum*, 846
photorespiration and ethylene release, *Xanthium/Salvia*, 871
photosynthesis and low water potential, sunflower, 161
position and water relations, wheat, 1041
propylamine transferase, Chinese cabbage, 645
pyruvate orthophosphate dikinase, maize, 189
red/far-red effects, tobacco chloroplast, 967
ribulose bisphosphate carboxylase activation, soybean, 681
senescence, maize, 368
stomata and CO_2 exchange, sunflower/cocklebur, 47
sugar uptake, cotton, 16
sulfate assimilation localization, maize/wheat, 866
urease, soybean, 800
Leaflet, Pi compartmentation, broad bean, 430
Lectin
activity, seed storage protein, oat, 675
Rhizobium recognition, *Lotononis*, 779
root/seed properties, *Lotononis*, 773
Leghemoglobin, root nodule, soybean, 984
Lettuce
chilling sensitivity and membrane lipid phases, 1016
light-inhibited seed germination, 186
triose phosphate isomerase isozymes, 340
Light
blue inhibition of hypocotyl elongation, cucumber, 897
-harvesting Chl *a/b* protein complex, PSI, 650
-inhibited seed germination, lettuce, 186
perception, phytochrome and action spectra, *Plantago/Sinapis/Bromus* seed, 601
protein synthesis, corn, 208
red/far-red effects, tobacco chloroplast, 967
Lilium auratum (*see* Lily)
Lilium longiflorum L. (*see* Lily)
Lily
desiccation and pollen germination, 746
pollen invertase, 510
Lipid
metabolism, *Anabaena*, 134
synthesis, seed development, soybean, 622
Lotononis bainesii
lectin, 773, 779
Rhizobium recognition, 779
Lycopersicon esculentum (*see* Tomato)
Lycoris radiata (*see* Cluster amaryllis)
Lysophospholipase, GA_3-treated aleurone, barley, 940
Luffa cylindrica (*see* Sponge cucumber)

M

Magnesium deficiency, suberization, corn, 256
Maize
auxin binding site inactivation, 1035
azido auxin binding, 295
endosperm protein synthesis, 389
enzyme deficiency, 324
IAA root transport, 971
mitochondrial ATPase activity, 632
O_2 incorporation, photorespiration, 108
photochemical units in chloroplasts, 993
pyruvate orthophosphate dikinase, 189
sulfate assimilation localization, 866
water potential gradients, 882
whole plant and leaf senescence, 360, 368
Maltotriose biosynthesis, spinach, 795
Manganese-deficient thylakoid freeze-fracture, spinach, 735
Membrane
chilling sensitivity and phases of lipids, sensitive/resistant plants, 1016
composition, iron deprivation, *Anacystis*, 90
potential, fusaric acid, tomato, 39
Mercurialis annua L., host genome and cytokinin metabolism, 139
Methionine
kernel incorporation, maize, 389
storage protein, soybean, 576, 584
Methylamine, nitrogenase regulation, *Anabaena*, 701
Mg^{2+}, chloroplast envelope permeability, pea, 956
Mitochondria
ATPase modulation, oat, 827
calcium transport and HmT toxin, corn, 804
Monoclonal antibodies, phytochrome, pea/oat, 123

N

NADH oxidation system, ion transport, corn, 219
1-Naphthyl acetic acid, binding inactivation by phenylglyoxal, maize, 1035
Nerium oleander L. (*see* Oleander)
Neurospora crassa, calcium ionophore

A23187 and circadian clock, 268
Nicotiana tabacum L. (*see* Tobacco)
Nitrogen
assimilation
cell growth, *Chenopodium*, 947
seed development, soybean, 128
meristem carbohydrate metabolism, tall fescue, 595
source
nutrition, soybean, 329
ureides, soybean, 227
utilization, pea, 822
Nitrogenase, regulation by ammonium, *Anabaena*, 701
Nodule
asparagine biosynthesis, soybean, 605
cytokinin metabolism, pea, 239
formation, salinity, soybean, 72
leghemoglobin, soybean, 984
sucrose breakdown enzymes, soybean, 1030
Nuclear magnetic resonance, mitochondrial ATPase activity, maize, 632

O

Oat
auxin and coleoptile section growth, 335
globulin quantitation, 455
mitochondrial ATPase modulation, 827
monoclonal antibodies to phytochrome, 123
phytochrome chromophore oxidation, 755
seed storage protein and lectin activity, 675
Oleander, psychrometry/pressure chamber water potential, 316
Onoclea sensibilis, spore germination and rhizoid differentiation, 656
Opuntia erinacea, early morning CAM, 1050
Ornithine decarboxylase, DNA synthesis, *Chlorella*, 385
Orthophosphate
cell respiration, sycamore, 355
leaflet compartmentation, broad bean, 430
Osmoregulation
Chara, 252
Chlorella, 1010
Oxygen
-evolving particles, *Anacystis*, 742
incorporation, photorespiration, maize, 108
isotope ratios, cellulose, C_3/C_4/CAM plants, 104
transport, *Zostera*, 1055
Ozone
peroxidase release, *Sedum*, 846
photodetoxification, pea/tomato, 999

P

Parthenium argentatum (*see* Guayule)
Pea
air pollutant phytotoxicity, 999
chloroplast
envelope permeability, 956
fatty acid synthesis, 890
thylakoid protein phosphorylation, 348
glycine to serine conversion, 705
leaf amino acid metabolism, 822
monoclonal antibodies to phytochrome, 123
phytohormones, *Rhizobium* mutants, and nodulation, 239
Pear, heat stress response, 944
Pepper, plastid terpenoid metabolism, 112
Peroxidase, ozone-induced release, *Sedum*, 846
Persea americana (*see* Avocado)
Phenylglyoxal, 1-naphthyl acetic acid binding inactivation, maize, 1035
Phenylpropanoid, metabolism site in ER, *Hippeastrum*, 901
Phloem bleeding, cryopunctured fruit, cowpea, 499
Phosphatidylglycerol, temperature-dependent phase behavior, chilling-sensitive/resistant plants, 1016
Phospholipid molecular species
chloroplast, chilling effects, *Dunaliella*, 198
microsomal, chilling effects, *Dunaliella*, 193
Photochemical apparatus, *Anacystis*, 67
Photocontrol, hypocotyl elongation, cucumber, 897
Photoinactivation, plasma membrane ATPase, rose, 617
Photolysis, azido auxin, soybean, 289
Photon flux density, UV-B sensitivity, soybean, 475
Photorespiration
ethylene release, *Xanthium/Salvia*, 871
O_2 incorporation, maize, 108
Photosynthesis
acclimation to low water potential, sunflower, 161
oxygen transport, *Zostera*, 1055
ploidy, wheat, 12
ribulose-1,5-bisphosphate carboxylase, wheat, 759
thermal stability, desert plants, 786
Photosynthetic pathways, ribulose-1,5-bisphosphate carboxylase, spinach/bean/*Chlamydomonas*, 791
Photosystem, electron transport capacity, maize chloroplast, 993
Photosystem I, Chl *a*/*b* protein complex, 650
Photosystem II, O_2-evolving particles, *Anacystis*, 742
Phytoalexin accumulation elicitation, soybean, 52
Phytochrome
action, ethanol effects, *Rumex*, 223
ATPase activity modulation, oat, 827
chromophore oxidation, oat, 755
light perception, *Plantago/Sinapis/Bromus* seed, 601
monoclonal antibodies, pea/oat, 123
Phytoene synthetase activity, wheat/pepper, 112
Phytohormone, *Rhizobium* mutants and nodulation, pea, 239
Phytotoxicity, air pollutants, pea/tomato, 999
Pigment
composition, chilling-stressed soybean, 749
variation, leaf Cu, sugar beat, 717
Pine, growth regulator activity, 626
Pinus radiata (*see* Pine)
Pistacea vera L. (*see* Pistachio)
Pistachio, psychrometry/pressure chamber water potential, 316
Pisum sativum L. (*see* Pea)
Plantago major L., action spectra for light perception, 601
Plasma membrane
and tonoplast, red beet, 549
ATPase, rose, 611, 617
Plasmalemma
ion transport, corn, 219
transport, 2-[4-(2′,4′-dichlorophenoxy) phenoxy]propionic acid, *Chara*, 61
Plastid, terpenoid metabolism, wheat/pepper, 112
Plastoquinone variation, leaf Cu, sugar beet, 717
Plastoquinone A accumulation, low temperature growth, rye, 727
Ploidy, photosynthesis, wheat, 12
Pollen
imbibitional chilling injury, *Typha*, 815
invertase, lily, 510
Polyamine metabolism, barley aleurone, 975
cis-Polyisoprene synthesis, low temperature stimulation, guayule, 534
Polyproline II conformation, carrot, 247
Polysaccharide, and cellulose, *Rosa*, 687
Porphyridium cruentum, effective absorption cross-sections, 451
Potato, papain inhibitor, 907
Pressure bomb, acoustic emissions measurement, white cedar, 1046
Proline metabolism, thioproline effects, barley, 213
Propylamine transferase, Chinese cabbage, 645
Protease, storage protein degradation, bean, 494
Protein
cadmium-binding, *Agrostis* root, 1025
crystalloid synthesis, castor bean, 1006
crystals, cysteine proteinase inhibitor, potato, 907
phosphorylation, thylakoid, tobacco/spinach/pea, 348
salt-stress, tobacco, 506
structure, extension precursor, carrot, 247
synthesis
desiccation, *Tortula*, 21
maize, 389
plant desiccation, *Tortula/Cratoneuron*, 917, 923
root cap, corn, 208
Protoheme synthesis, *Cyanidium*, 146
Protoplast, plasmalemma ion transport, corn, 219
Prunus sp., xylem development and deep supercooling, 862
Pulp tissue aging, apple, 380
Pumpkin, catalase in cotyledons, 261
Pyrophosphate:Fructose-6-phosphate phosphotransferase, castor bean, 395
Pyrus communis (*see* Pear)
Pyrus malus L. (*see* Apple)
Pyruvate kinase isoform, spinach, 374
Pyruvate orthophosphate dikinase, site of synthesis, maize, 189

R

Radioimmunoassay, globulin quantitation, oat, 455
Radish, storage protein, 487
Raphanus sativus (*see* Radish)
Red beet
plasma membrane and tonoplast, 549
tonoplast H^+-ATPase, 538, 545
Rhizobium
mutants, phytohormones and nodulation, pea, 239
recognition, role of lectin, *Lotononis*, 779
Rhizobium japonicum-soybean symbiosis, host recognition, 84
Rhizoid differentiation, spore germination, *Onoclea*, 656
Ribosyl zeatin, lateral shoot initiation, pine, 626

Ribulose bisphosphate carboxylase
leaf activation, soybean, 681
photosynthesis, wheat, 759
photosynthetic pathways, spinach/bean/*Chlamydomonas*, 791
Ricinus communis L. (*see* Castor bean)
RNA, N^6-benzyladenine incorporation, tobacco, 663, 669
Root
ABA, chilling, and water conductance, soybean, 81
cadmium-binding protein, *Agrostis*, 1025
cap, light-stimulated protein synthesis, corn, 208
cytokinin metabolism, pea, 239
graviresponse and columella tissue development, castor bean, 529
hair membrane potential, fusaric acid, tomato, 39
hormones and sucrose uptake, sugar beet, 951
IAA transport, maize, 971
lectin, *Lotononis*, 773
Mg deficiency and suberization, corn, 256
mitochondrial ATPase activity, maize, 632
nodule leghemoglobin, soybean, 984
oxygen transport, *Zostera*, 1055
plasmalemma ion transport, corn, 219
polyproline II conformation, carrot, 247
sugar uptake, cotton, 16
uronide deposition rate, corn, 721
Rosa damascena (*see* Rose)
Rosa glauca, primary cell wall structure, 687, 694
Rose, cell plasma membrane ATPase, 611, 617
Rumex crispus L., ethanol and phytochrome action, 223
Rye, plastoquinone A accumulation and low temperature, 727

S

Salinity
nodule formation, soybean, 72
photosynthetic response, mangrove, 1, 7
wheat, 417
Salt
adaptation, *Synechococcus* 6311, 183
-stress proteins, tobacco, 506
Salvia splendens L., photorespiration and ethylene release, 871
Sapwood, pressure bomb acoustic emissions, white cedar, 1046
Saxifraga cernua, mesophyll/guard cell chloroplast fluorescence, 481
Sedum album, ozone-induced peroxidase release, 846
Seed
action spectra for light perception, *Plantago/Sinapis/Bromus*, 601
crystalloid protein synthesis, castor bean, 1006
development
4-Cl-IAA, broad bean, 320
lipid synthesis, soybean, 622
nitrogen assimilation, soybean, 128
ethanol and phytochrome action, *Rumex*, 223
lectin, *Lotononis*, 773
light-inhibited germination, lettuce, 186
nitrogenous nutrition, soybean, 329
polyamine metabolism and aleurone GA_3 response, barley, 975
storage protein
biosynthesis, *Agrostemma*, 516
lectin activity, oat, 675
Seedling
auxin and coleoptile section growth, oat, 335
ethylene binding, 525
galacturonic acid oligomers as elicitors, castor bean, 989
gravitropic adaptation, corn, 302
gravity response, corn, 284
heat shock protein synthesis, soybean, 152
kaurene synthetase activity, sunflower, 439
Senescence
leaf, maize, 368
whole plant, maize, 360
Serine synthesis, glycine decarboxylation, pea, 705
Shoot
apical growth control, sunflower, 408
arabinogalactan structure, corn, 562
geotropism, sunflower, 272
growth regulator activity, pine, 626
IAA-*myo*-inositol, corn, 278
Sinapis arvensis L. action spectra for light perception, 601
Sink-source translocation, soybean, 434
Solanum nodiflorum, chloroplast fatty acid synthesis, 890
Solubilization, plasma membrane ATPase, rose, 611
Solute permeability, *Chara*, 464
Source/sink tissue, ABA metabolism, sugar beet, 810
Soybean
ABA, chilling, and roots, 81
amino acid efflux, 26
asparagine biosynthesis, 605
azido auxin photolysis, 289
chilling-stressed, chloroplast responses, 749
CO_2 and water relations, 233
ethylene binding, 525
host-pathogen interactions, 52
kaempferol glycoside, 877
leaf urease, 800
methionine and storage protein, 576
nitrogen assimilation and seed development, 128
nitrogenous nutrition, 329
-*Rhizobium* symbiosis, host recognition, 84
ribulose bisphosphate carboxylase activation, 681
root nodule leghemoglobin, 984
salinity and nodule formation, 72
seed development and lipid synthesis, 622
sink to source translocation, 434
sucrose breakdown enzymes, 1030
sulfate and storage protein, 584
thermotolerance: heat shock protein synthesis, 152
ureides and nitrogen source, 227
UV-B radiation, 475
Spectral form, phytochrome chromophore oxidation, oat, 755
Spinach
chilling sensitivity and membrane lipid phases, 1016
chloroplast thylakoid protein phosphorylation, 348
enolase, 834
fructose 2,6-bisphosphate and carbon partitioning, 445
H_2O_2-dependent flavonol oxidation, 852
high temperature acclimation, 402
inorganic carbon uptake, 962
leaf debranching enzyme, 856
maltotriose biosynthesis, 795
Mn-deficient thylakoid freeze-fracture, 735
pyruvate kinase isoforms, 374
ribulose-1,5-bisphosphate carboxylase and photosynthetic pathway, 791
temperature and energy transduction, 170
triose phosphate isomerase isozymes, 340
Spinacia oleracea L. (*see* Spinach)
Sponge cucumber, chilling sensitivity and membrane lipid phases, 1016
Squash, chilling sensitivity and membrane lipid phases, 1016
Starch
degradation, *Chlamydomonas*, 459
labeling, and [^{14}C]sucrose uptake, barley, 43
metabolism, guard cell, broad bean, 424
State 1-State 2 transition, thylakoid protein phosphorylation, tobacco/spinach/pea, 348
Stem, α-amylase activity regulation, bean, 841
Stomata
CO_2 exchange, sunflower/cocklebur, 47
salinity and humidity, mangrove, 1
Storage protein
biosynthesis, *Agrostemma*, 516
degradation, bean, 494
lectin activity, oat, 675
methionine effects, soybean, 576
sulfate effects, soybean, 584
radish, 487
Spore germination, rhizoid differentiation, *Onoclea*, 656
Suberization, Mg deficiency, corn, 256
Sucrose
breakdown enzymes, soybean, 1030
uptake
hormone effects, sugar beet, 951
starch labeling, barley, 43
Sugar uptake, cotton, 16
Sugar beet
hormones and sucrose uptake, 951
pigment/plastoquinone variation and leaf Cu, 717
source/sink tissue ABA metabolism, 810
Sulfate
assimilation localization, maize/wheat, 866
storage protein, soybean, 584
Sulfur formation, *Chlorella*, 176
Sulfur dioxide, photodetoxification, pea/tomato, 999
Sunflower
apex and shoot geotropism, 272
kaurene synthetase activity, 439
photosynthesis and low water potential, 161
psychrometry/pressure chamber water potential, 316
shoot apex and cotyledonary growth, 408
stomata and CO_2 exchange, 47
Sweet potato, chilling sensitivity and membrane lipid phases, 1016
Sycamore, Pi and cell respiration, 355
Synechococcus 6311, salt adaptation, 183

T

Tall fescue, leaf meristem carbohydrate metabolism, 590, 595
Temperature
-dependent lipid phase behavior, chilling-sensitive/resistant plants, 1016
heat stress, pear, 944
high
acclimation, spinach, 402

photosynthesis, desert plants, 786
low
GA_3 sensitivity induction, wheat, 437
K^+ influx regulation, barley, 730
plastoquinone A accumulation, rye, 727
cis-polyisoprene synthesis, guayule, 534
photosynthetic energy transduction, spinach, 170
water relations, *Abies*, 77
Terpenoid metabolism, plastid, wheat/pepper, 112
Tetranitromethane, phytochrome chromophore oxidation, oat, 755
Thermotolerance, heat shock protein synthesis, soybean, 152
Thioproline, proline metabolism, barley, 213
Thuja occidentalis L. (*see* White cedar)
Thylakoid
membrane freeze-fracture, Mn-deficient spinach, 735
protein phosphorylation, tobacco/spinach/pea, 348
Tobacco
Cellulysin-induced ethylene production, 99
chloroplast thylakoid protein phosphorylation, 348
ethionine-resistant cell line, 640
glutamine synthetase subunit composition, 448
N^6-benzyladenine incorporation, 663, 669
red/far-red effects, chloroplast structure, 967
salt-stress proteins, 506
Tomato
air pollutant phytotoxicity, 999
biochemistry of fruit ripening, 32
membrane potential, fusaric acid, 39
psychrometry/pressure chamber water potential, 316
Tonoplast
H^+-ATPase activity, red beet, 538, 545
plasma membrane, red beet, 549
Tortula ruralis, desiccation and protein synthesis, 21, 917, 923
Toxin, biological activity, *Helminthosporium*, 117
Transpiration, water potential, maize, 882
Trichoderma harzianum, electric current around photoinduced growing hyphae, 912
Triose phosphate isomerase isozyme, spinach/lettuce/celery, 340
Triticum sativum L. (*see* Wheat)
Triticum sp. (*see* Wheat)
Turgor
regulation, *Chara*, 252
solute permeability, *Chara*, 464
Typha latifolia, imbibitional chilling injury of pollen, 815

U

Urease, soybean leaf, 800
Ureide, nitrogen source, soybean, 227
Uronide deposition rate, corn, 721
Ultraviolet-B, soybean, 475

V

Vicia faba L. (*see* Broad bean)
Vigna unguiculata L. (*see* Cowpea)

W

Water
conductance
ABA and chilling, soybean, 81
temperature, *Abies*, 77
potential
gradients, maize, 882
leaf excision, *Citrus*, 96
photosynthesis, sunflower, 161
psychrometer and pressure chamber measurement, species comparison, 316
relations
CO_2 influence, soybean, 233
leaf position, wheat, 1041
temperature, *Abies*, 77
Wheat
ethylene binding, 525
leaf position and water relations, 1041
low temperature induction of GA_3 sensitivity, 437
plastid terpenoid metabolism, 112
ploidy and photosynthesis, 12
ribulose-1,5-bisphosphate carboxylase and photosynthesis, 759
salinity response, 417
sulfate assimilation localization, 866
White cedar, pressure bomb acoustic emissions, 1046
Wild sunflower, psychrometry/pressure chamber water potential, 316

X

Xanthium strumarium L. (*see* Cocklebur)
Xerosicyos danguyi, ADPglucose pyrophosphorylase, 711
Xylem, deep supercooling, *Prunus*, 862
Xyloglucan, primary cell wall, *Rosa*, 694

Z

Zea mays L. (*see* Corn, Maize)
Zostera marina, oxygen transport, 1055